

Tahoe Sierra IRWMP

Attachment #8

Water Quality and Other Expected Benefits

Table 16 - Water Quality and Other Expected Benefits

(All benefits should be in 2009 dollars)

Project: Project 1 - Community Watershed Planning - Tahoe Resource Conservation District

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) - (d)	Unit \$ Value (f)	Annual \$ Value (f) x (g) (i)	Discount Factor (i)	Discounted Benefits (h) x (i) (j)
2011	Water Quality	Sediment - Tons per year	1318	580	-738	NA	NA	0.890	NA
	Water Quality	Total Nitrogen - Tons per year	41	19	-22	NA	NA	0.890	NA
	Water Quality	Dissolved Nitrogen - Tons per year	3.25	2	-1.25	NA	NA	0.890	NA
	Water Quality	Total Phosphorus - Tons per year	11	5.75	-5.25	NA	NA	0.890	NA
2012	Water Quality	Sediment - Tons per year	1318	580	-738	NA	NA	0.840	NA
	Water Quality	Total Nitrogen - Tons per year	41	19	-22	NA	NA	0.840	NA
	Water Quality	Dissolved Nitrogen - Tons per year	3.25	2	-1.25	NA	NA	0.840	NA
	Water Quality	Total Phosphorus - Tons per year	11	5.75	-5.25	NA	NA	0.840	NA
	Water Quality	Acres treated for invasive weed species	0	50.7	50.7	\$49	\$2,459	0.840	\$2,066
2013	Water Quality	Sediment - Tons per year	1318	580	-738	NA	NA	0.792	NA
	Water Quality	Total Nitrogen - Tons per year	41	19	-22	NA	NA	0.792	NA
	Water Quality	Dissolved Nitrogen - Tons per year	3.25	2	-1.25	NA	NA	0.792	NA
	Water Quality	Total Phosphorus - Tons per year	11	5.75	-5.25	NA	NA	0.792	NA
	Water Quality	Acres treated for invasive weed species	0	50.7	50.7	\$49	\$2,459	0.792	\$1,947
2014	Water Quality	Sediment - Tons per year	1318	580	-738	NA	NA	0.747	NA
	Water Quality	Total Nitrogen - Tons per year	41	19	-22	NA	NA	0.747	NA
	Water Quality	Dissolved Nitrogen - Tons per year	3.25	2	-1.25	NA	NA	0.747	NA
	Water Quality	Total Phosphorus - Tons per year	11	5.75	-5.25	NA	NA	0.747	NA
	Water Quality	Acres treated for invasive weed species	0	50.7	50.7	\$49	\$2,459	0.747	\$1,837
Project Life	Water Quality	Sediment - Tons per year	5272	2320	-2952	NA	NA	0.817	NA
	Water Quality	Total Nitrogen - Tons per year	164	76	-88	NA	NA	0.817	NA
	Water Quality	Dissolved Nitrogen - Tons per year	13	8	-5	NA	NA	0.817	NA
	Water Quality	Total Phosphorus - Tons per year	44	23	-21	NA	NA	0.817	NA
	Water Quality	Acres treated for invasive weed species	0	152	152	\$49	\$7,372	0.817	\$6,023

Total Present Value of Discounted Benefits Based on Unit Value
(Sum of the values in Column (j) for all Benefits shown in table)

\$6,023

Transfer to Table 20, column (f), Exhibit F: Proposal Costs and Benefits Summaries

Comments: 1) Reductions for water quality constituents (sediment, nitrogen, phosphorus) are derived from attached Pollutant Load Reduction Landuse excel spreadsheet and are based on implementation of erosion control BMPs on 250 properties. 2) Once BMPs are installed on properties, the total pollutant loading into local waterways will continue to be reduced by the numbers documented above (tons per year) as long as BMPs are maintained and remain functional. 3) Based on dollar amount to be allocated for treatment of invasive weeds, it is expected that a total of 152 acres could be surveyed and treated for invasive weed populations at a cost of \$49 per acre.

Community Watershed Planning – Tahoe RCD **Support for Economic Analysis (Water Quality)**

Background

Community Watershed Planning is a nationally recognized effort established by the Natural Resource Conservation Service to identify and address specific natural resource issues within a given area (watershed) and to bring key stakeholders together to initiate discussion and to formulate potential solutions to the natural resource issues identified.

The goal of this project is to implement an innovative process through the initiation of a comprehensive Community Conservation Planning and Implementation effort to address natural resource management on a watershed or sub-watershed level. Primary outcomes of proposed project include:

- Coordination and improved efficiency and effectiveness of conservation efforts
- Create opportunities for load reductions of significant pollutants affecting the clarity of Lake Tahoe.
- Implementation of Basin wide mandates including implementation of BMPs, fire defensible space activities and invasive species control.
- Increase participation in conservation efforts by area landowners/stakeholders

Watersheds targeted for Community Watershed Planning activities in this round of funding will be selected based on priorities from the science community, the regulatory community, and the implementing jurisdictions, communities interest in participating, and a mixture of proposed Environmental Improvement Program (EIP) projects and TMDL implementation opportunities that will benefit from enhanced coordination efforts. Watershed efforts will focus on addressing non-point source pollutants from private parcels, conservation landscaping, fire defensible space, agency and stakeholder coordination and invasive weed management.

Conditions under a “No Project” Scenario

1. **No BMPs Installed.** No site-specific, parcel-level BMPs would be installed on private properties in the California-Tahoe Basin, leading to an increase in pollutant loading in local tributaries and in Lake Tahoe. Lack of implementation on private parcels will also lead to increased sizing, cost of installation and operations and maintenance of public stormwater treatments and facilities. If public facilities currently exist within targeted watershed and private parcels are left un-treated, stormwater would flow to public EIP treatment facilities, over-taxing these systems and potentially causing failure.

Based on the estimated pollutant contribution by land use, as noted in the Load Reduction spreadsheet developed by GeoSyntec Consultants, the following constituents would enter into local waterways with a “no project” scenario. Numbers are based on implementation of BMPs on 250 single-family (estimates will double if installation were to occur on 500 properties).

- 2320 tons of total suspended sediment would impact surface waters.
- 77 tons of Total Nitrogen (TN), 8 tons of Dissolved Nitrogen (DN), and 23 tons of Total Phosphorus (TP) would enter into local waterways
(See attached Excel spreadsheet utilized to calculate values).

In addition to the direct reductions mentioned above, the installation of Best Management Practices on single family residential properties reduces the total stormwater runoff and associated pollutants from entering into the public storm water improvement facilities that are mandated in the Tahoe Basin. This reduction, in turn, allows local jurisdictions to construct smaller stormwater detention basins leading to increased cost savings of actual construction and of future operations and maintenance.

2. **Reduced Technical Assistance Provided.** Technical assistance provided by RCD staff enables landowners to implement conservation practices on their property that helps to preserve the unique environment in the Lake Tahoe Basin. If project goes unfunded, the ability of Tahoe RCD staff to provide technical assistance to local property owners will be significantly reduced. Full project implementation will result in technical assistance provided to a minimum of 125 property owners.
3. **No Outreach Conducted.** Outreach conducted through this project will be developed to increase environmental awareness and stewardship amongst community members and to solicit input from stakeholders on priority watershed issues, needs and concerns. No outreach conducted will lead to “status quo” where community members continue to be unaware and potentially apathetic about existing local environmental issues. Full project implementation will result in:
 - outreach conducted to a minimum of 1000 community members
 - involvement of a minimum of 200 stakeholders in community watershed planning process
4. **Lack of coordination and integration.** Project coordination and integration amongst private and public landowners will lead to lack of discussion and missed opportunities to facilitate a cost effective means of addressing natural resource issues identified in targeted watershed area. Full project implementation will result in:
 - Inventory of natural resource issues and concerns within targeted watersheds
 - Hosting of a minimum of 4 public forums to initiate discussion on solutions proposed for identified natural resource issues
 - Development of Community Watershed Plans detailing inventory of natural resource issues, proposed solutions and future opportunities for targeted areas.

5. **No Control or Management of Invasive Species.** Unchecked invasive weed infestations can reduce the biological, recreational, and economic value of the land, impair water quality, reduce native plant populations, and degrade important ecosystems. For weed management efforts to be successful, a coordinated, integrated, watershed-wide approach is necessary. The Tahoe Basin is in the relatively early stages of infestation by invasive weeds, so early detection and rapid response (EDRR) are the forefront of our efforts. By detecting and eradicating small populations early and quickly, land owners and managers can ultimately save dollars and time, while preserving the natural wonders of the region from damage by invasive plants. By increasing awareness to the general public regarding the invasive weeds of concern in their community, we can maximize our early detection and rapid response efforts. Full project implementation will result in:
 - Providing technical assistance to a minimum of 125 landowners with identification, control and conservation landscaping plans.

Other Benefits

1. **Water Conservation.** Through the technical assistance component of the BMP Retrofit Project, property owners will be encouraged to avoid over-irrigation, protect soil moisture through applying mulch, and plant native (drought tolerant) vegetation instead of turf grass. These activities will conserve drinking water resources that would have otherwise been used for inefficient landscaping practices.
2. **Fire Defensible Space.** Technical assistance provided to homeowners will include information related to the integration of fire defensible space and erosion control practices, thus reducing the impacts of a catastrophic wildfire. It is also expected that fuels reduction/wildfire threat may be identified as a primary concern within targeted watersheds leading to increased collaboration amongst property owners to address this issue on a watershed scale.
3. **Property Protection.** BMP installation and water-wise irrigation practices prevent water damage to building foundations, decks, siding, and paved driveways.
4. **Support to the EIP Program.** Over \$1 Billion state and federal dollars are set aside for the implementation of public EIP projects. This money was dedicated with the understanding that private landowners would pay for their own water quality improvements, thus providing the “match” for the public investment. Without the private contribution to the EIP Program, these large-scale non-point source pollution control projects for Lake Tahoe would go unfunded and unimplemented.
5. **Ecosystem Restoration.** Infestation of invasive weed populations within targeted watersheds will lead to degradation of land, reduction in property value and increased erosion. Management and control of these populations will lead to an increase in wildlife habitat, native plant establishment and increase water quality.

Attachment 8 - Project 2
Water Quality and Other Expected Benefits
Town of Truckee – Water Quality Monitoring Program

The Truckee River Water Quality Monitoring Plan (TRWQMP) has been created in response to an order issued by the Lahontan Regional Water Quality Control Board (the Board). The California Water Code Section 13267 Board order, issued to both Placer County (the County) and the Town of Truckee (the Town) on March 9, 2007 and July 3, 2007, respectively, required the creation of a comprehensive monitoring plan for the middle Truckee River. Though regulated under separate board orders, the County and Town chose to coordinate efforts in the development of a monitoring program to ensure the cost-effective collection, integration and analysis of water quality data within the watershed. The TRWQMP has been completed and approved. In 2009, the Town voluntarily started implementing Phase I of the TRWQMP, but requires additional funds for implementation and operation of Phase II of the plan.

The TRWQMP is a tool to monitor the effectiveness of stormwater programs and improvement projects in the Truckee River Watershed. Both the County and the Town have developed and are implementing Stormwater Management Programs (SWMPs). The respective SWMPs detail the specific actions each jurisdiction (County and Town) will implement in order to protect surface water. Each jurisdiction is responsible for the water quality monitoring on waters within their boundaries.

The project area covered under the TRWQMP includes the main stem of the middle Truckee River and all areas contributing surface water runoff between its outlet from Lake Tahoe and its confluence with Juniper Creek. This area includes 15 sub-watersheds, which drain to the main stem of the Truckee River either through tributaries, direct runoff, or stormwater infrastructure. Preliminary screening for potential source areas was conducted using an integration of GIS data on land use, land condition and other human disturbances. The analysis resulted in the classification of each sub-watershed as low, medium or high disturbance. Of the seven identified high disturbance sub-watersheds, three are in Truckee including Truckee Town Corridor, Donner/Cold Creeks and Trout Creek. The TRWQMP was subsequently designed to focus monitoring resources and efforts on those high disturbance sub-watersheds where water quality is expected to be the most impaired and where the majority of actions under the Town's SWMPs are expected to be implemented.

The Town has begun the implementation of Phase I. Funding will allow the implementation of Phase I and Phase II and will provide the operation of the Water Quality Monitoring Program for three years. All data will be analyzed and reported.

The base of this project is the Truckee River Water Quality Management Plan (TRWQMP) which references many existing documents such as the USGS National Field Manual for the Collection of Water-Quality Data, SWAMP Program, Middle Truckee River TMDL and Truckee's SWMP.

Areas to be monitored focus on areas of the Truckee River Watershed within the Town of Truckee with the greatest risk of pollutants of concern. The TRWQMP was developed using

SWAMP protocols, existing USGS National Field Manual for the collection of Water-Quality Data protocols, as well as other methods for data collection, reporting and QA/QC that are scientifically defensible and repeatable.

The TRWQMP provides a framework for reporting data and comprehensive analysis. An annual report will be produced every year and results of the monitoring data coordinated with the annual reporting and effectiveness evaluation for the Stormwater Management Programs. Annual reports will be posted on the Town's website. Data will be reported to the Truckee River Information Gateway (TRIG) and will be available to other agencies and the public.

Table 16 - Water Quality and Other Expected Benefits
(All benefits should be in 2009 dollars)
Project 4 - Negro Canyon Restoration Project - Truckee River Watershed Council

[illegible]

Attachment 8: **Project 7**
Bijou Creek Culvert Replacement Project
Bijou Area Erosion Control Project
Exhibit D – Water Quality and Other Expected Benefits
City of South Lake Tahoe
December 2010

Water Quality Benefit

The Bijou Creek Culvert Replacement Project (Project) will provide water quality benefit as it is the first critical step in implementing the larger Bijou Area Erosion Control Project (ECP). The existing storm drain system which discharges directly to Lake Tahoe (Bijou Creek outfall) is undersized and in a failing condition, i.e., portions of the existing corrugated metal storm drain pipe have no invert remaining, thereby allowing sediment and debris to enter the pipe and undermine the structure. The existing storm drain creates a 'choke' point for drainage from the 1300 acre upper watershed, City of South Lake Tahoe (City) right-of-way (ROW), and Caltrans ROW to Lake Tahoe.

Pre-project physical conditions

As noted above, the existing system is undersized and failing. Replacing the failing conveyance will allow the City to install Best Management Practices (BMPs) to treat the urban runoff from the more heavily polluted highways and commercial areas without concern for worsening the existing drainage condition. The Bijou Creek outfall has been determined to be a high priority outfall for treatment by the State Water Resources Control Board, Lahontan Region (Lahontan), the City, and the Tahoe Regional Planning Agency (TRPA). Currently, storm water from the upper watershed combines with drainage from the highway 50 commercial core, and flows through the existing drainage system, untreated, to Lake Tahoe. During storm events, the runoff often exceeds the capacity of the storm drain system and flows overland, picking up sediment and debris and carrying it directly to Lake Tahoe. Analytical results for water quality samples collected at the Bijou Creek outfall are shown in Table 1.

Table 1
Storm Water Analytical Results at Bijou Creek Outfall
City of South Lake Tahoe, California

concentrations in milligrams per liter (mg/L) unless otherwise noted

Sample Name	Sample Date	N (calculated)	Total Phosphorous	Fe	Turbidity ¹	TSS	Oil & Grease
Bijou Outfall	1/4/2008	0.95	0.99	6.4	620	830	18
Bijou Outfall	1/4/2008	0.5	0.72	4	390	500	14
Bijou Outfall	7/14/2008	9.3	0.27	8.9	1500	3300	65
Bijou Outfall	1/22/2009					568	
Bijou Outfall	1/23/2009					180	
Bijou Outfall	1/23/2009					205	
Bijou Outfall	1/23/2009					975	
Bijou Outfall	1/23/2009					472	
Bijou Outfall	10/13/2009	5.5	0.33	4.5	120	140	6.5
Bijou Outfall	10/13/2009	2.3	0.23	2	61	110	5
Bijou Outfall	10/13/2009	1.5	0.21	3.9	70	170	4.2
LAHONTAN²		0.5	0.1	0.5	20	--	2
TRPA³		0.5 ⁴	0.1 ⁴	0.5 ⁴	--	--	2

Notes

1. analytical results reported in nephelometric turbidity units (NTU)
2. Lahontan Regional Water Quality Control Board effluent discharge limit to surface water.
3. Tahoe Regional Planning Agency effluent discharge limit to surface water.

Over the years, substantial repair and maintenance of the existing drainage system has been required. Notably, the City performed significant maintenance and repairs in 2001 to remove sediment blocking the pipe underlying commercial property. This work included removal and replacement of a segment of the underground pipe and repairs to the pipe outfall at Lake Tahoe. In 2007, the City again repaired a portion of the pipe and a drop inlet that had failed in the commercial property parking lot. This failure caused a sink hole in the asphalt around the pipe and drop inlet. The emergency repair work included excavation of the failed pipe and drop inlet, removal and replacement of a portion of pipe, repair to the inlet, and backfill and paving over the area.

Post-project physical conditions

The Project proposes to replace the existing storm drain with a new double box culvert to convey adequate flows (10-year design storm per El Dorado County Drainage Manual requirements) from the upper watershed, through the commercial area, to Lake Tahoe. The new culvert will improve the quality of storm water discharging to Lake Tahoe by providing for separation of 'clean' storm water runoff from the upper watershed to be conveyed to Lake Tahoe, without interception from 'dirty' runoff from the Highway 50 commercial core. The culvert will be hydraulically isolated from the commercial core storm water runoff, thereby only discharging

water from the upper watershed to Lake Tahoe. Commercial core runoff will be collected in a separate drainage system and treated to remove pollutants, prior to discharge.

Description of Methods used to estimate with/without project conditions

Lake Tahoe TMDL research has shown that 70% of the fine sediment entering Lake Tahoe is coming from urban runoff and that the Bijou Creek outfall is the second worst concentration level outfall to Lake Tahoe in the Tahoe basin.

Additionally, TMDL modeling estimates that for equal impervious areas, Primary Road (i.e., highways) generate greater than three times more Total Suspended Solids (TSS) than Commercial/Institutional/Communications/Utilities (CICU) properties (i.e., Bijou commercial core), which subsequently generate more than three times more TSS than either secondary roads or multi-family residential properties. For this reason, treatment of storm water runoff from the Caltrans Highway 50 ROW, the Bijou commercial core, and the City ROW to the Bijou Creek outfall is a high priority water quality concern.

With the November 16, 2010 Lahontan Regional Water Quality Control Board adoption of the Lake Tahoe TMDL for fine sediment and nutrients, municipal jurisdictions will be required to reduce pollutant loads. Lahontan, TRPA, US Forest Service (LTBMU), and California Tahoe Conservancy staff recognize the Bijou Area ECP for the commercial core area as a highest priority project for reducing pollutant loads. Therefore, isolating the upper watershed runoff through construction of the culvert, will allow for treatment of the commercial core runoff, which will greatly improve the water quality discharging to Lake Tahoe.

Description of other benefits

The Project, while a critical first step for the larger water quality project (ECP), is also a significant stand-alone drainage improvement. The Project has been identified as a high priority drainage need in the City's Drainage Master Plan. It will provide both the City and Caltrans with adequate capacity to convey storm water runoff to Lake Tahoe, without concern for damage to private property in the commercial core, due to the potential for collapse of the existing failing drainage system. It also will alleviate flooding which occurs under storm events more frequent than the 10-year recurrence interval storm.

The 10 year, 24 hour flow calculated for the Bijou Creek outfall is 79.1 cubic feet per second (cfs). Caltrans' hydraulic engineers estimate the capacity of the existing storm drain at approximately 17 cfs. City crews have made numerous emergency repairs to replace collapsed sections of the pipe that have caused ground surface failure in commercial parking areas.

Description of benefits, beneficiaries, and timing

Lake Tahoe is a national recreational amenity, as well as a drinking water source for both California and Nevada. Therefore, improving the water quality of Lake Tahoe has both local, statewide, and national economic and recreational benefits. Beneficiaries include all those that utilize Lake Tahoe for recreational and for drinking water.

Additionally, Caltrans and the City will both benefit from resolution of a high priority drainage problem. Commercial properties within the drainage area will benefit from the improved

infrastructure and reduced threat of nuisance surface flooding. The threat of flooding or closure of Highway 50 through the heart of South Lake Tahoe will also be reduced.

Uncertainty associated with benefits

While the infrastructure improvement and subsequent drainage benefits will be immediate following construction, the larger water quality improvements are reliant upon construction of the first phase of the Bijou area ECP. However, separate funding of the Bijou Creek Culvert Replacement Project removes a significant funding burden from the larger ECP, which significantly improves the feasibility of the water quality project.

Adverse Effects

The only adverse effects are those temporarily associated with the construction effort. These will be mitigated through environmental mitigation measures.

Attachment 8, Exhibit D
Project 8 – Montgomery Estates Erosion Control Project
El Dorado County Department of Transportation
Water Quality and Other Expected Benefits
December 20, 2010

Narrative discussion of the estimates of without project physical conditions

Water Quality

A Pollutant Load Reduction (PLR) analysis was completed for the stormwater originating from the Montgomery Estates Project area (Table 2). The volume of runoff from the Project area was estimated from the product of average annual precipitation, watershed area, and directly connected imperviousness. The concentration of total suspended solids (TSS) was estimated based on Event Mean Concentrations (EMC) as a function of land use. The estimated annual sediment load in pounds of TSS from the entire Project area is 36,500 (Area 1); 53,500 (Area 2); and 7,400 (Area 3) with approximately half of the TSS being less than 20 microns. These total estimated loads are comprised of loads from County Right of Way, County parcels, California Tahoe Conservancy (CTC) parcels, USFS parcels, and Private parcels. For estimating the loads from the right of way (ROW) portion only, the County conducted a pollutant load reduction strategy (PLRS) (Table 3). This looked at the watershed (WSID) relative to the outfall discharge of the watershed. For this the County ROW was evaluated in terms of residential single family pervious, veg classes, residential single family impervious and secondary roads. Event EMCs were established for each landuse and loads calculated based on average annual precipitation. From this exercise the total pollutant mass was determined from each watershed and summed to evaluate the total mass associated with the entire project area in terms of Total Nitrogen (TN), Dissolved Nitrogen (DN), Total Phosphorous (TP), Dissolved Phosphorous (DP) and Total Suspended Solids (TSS) (Table 3). The total average annual suspended sediment (TSS) load transported from the project area was determined to be 4,313 pounds annually.

Narrative discussion of the estimates of with project physical conditions

The project will reduce the amount of TSS through the use of infiltration and conveyance to infiltration treatment areas. Infiltrating sediment traps will be installed to collect and control the use of deicing abrasives as well as allow for infiltration and volume storage reduction. Curb and gutter is being installed to armor eroding shoulders and provide for a solid edge of pavement to prevent snowplows from destroying native soils. Ten (10) infiltration basins are being installed to allow for large volume reductions and infiltration. The total net benefit is anticipated to be near the goal of a 33% reduction in sediment. The existing hydrology and hydraulics computations estimate that approximately 50,000 cubic feet of stormwater is generated from the right of way (ROW) portion of El Dorado County during the 25 year 1 hour event (Table 1). The storage capacity and net volume reduction of the design features for this project account for approximately 18,478 cubic feet (Table 4). This meets the goal of a 33% volume reduction of the 25 year 1 hour storm. The total annual load is approximately 4,313 pounds with an estimated 36%

reduction based on Event Mean concentrations (EMC), equating to a load reduction of 1,553 pounds for the project.

Description of methods used to estimate without and with project conditions

A Pollutant Load Reduction (PLR) analysis was completed for the stormwater originating from the Montgomery Estates Project area. The volume of runoff from the Project area was estimated from the product of average annual precipitation, watershed area, and directly connected imperviousness. The concentration of total suspended solids (TSS) was estimated based on Event Mean Concentrations (EMC) as a function of land use (See Summary in Table 3).

The total load reduction is based on the volume reduction as a result of infiltration, storage and treatment. This is estimated based on the size of the water quality structures, detention / infiltration volume and source reductions. Because an EMC is used for the calculation of load, the volume reduction and the pollutant load reduction will be the same for the design storm volume and average annual loads. A 36% volume reduction will equate to a 36% load reduction. It is anticipated that the project will exceed 36% due to first flush operating treatment structures and average annual rainfall intensities / quantities being much lower the estimated amounts. Typically urban areas see a mass and concentration first flush, which means that the system will more than likely treat a much higher percentage of pollutants than was estimated using the above mentioned methodologies.

Description of potential other benefits

Potential other benefits include the reduction of nutrients including phosphorous, erosion control, fisheries benefits as a result of less fine sediment clogging spawning gravels, groundwater recharge and public safety.

Description of the distribution of local, regional, and statewide benefits

Local Regional and Statewide benefits include the protection of an impaired water body and improved public safety from reductions of urban pollutants currently being transported to receiving water bodies. Local benefits include achieving compliance with the TMDL targets through the reduction of fine particulates (sediment) from the project area. Targeting fine particles of this size will also have nutrient load benefits to downstream waters. Other local benefits include the ease of maintenance of structures that capture deicing abrasives in sediment traps and conveyances. These practices control a large pollutant source allowing coarse solids to be easily captured and pulled from the system, rather than be transported downstream clogging conveyances and stream courses.

Identification of beneficiaries

The beneficiaries of this project include the local governments, general public and visitors of the Tahoe Basin. The local government benefits include the funding of capital for treatment of Environmental Improvement Project (EIP) areas. Funding this expense will reduce pollutant loads required as part of the Tahoe TMDL, helping to bring the

County closer to threshold objectives and improving stormwater quality. The general public benefits through the implementation of this project by the creation of suitable land that mimics the natural environment by allowing water to naturally infiltrate into the ground, which in turn creates a diverse and sustainable watershed with minimal pollution.

When the benefits will be received

The benefits from this project will be realized as soon as construction is complete. The project could be implemented as soon as summer 2011, however with contracting between the State of California, the IRWMP grant administrator and EDOT, it is anticipated that the funding for this project may not be used for construction until summer 2012. This project is planned for phased construction this summer, so in the event contracting facilitates expedited implementation, the construction may proceed sooner. The construction season and grading deadline in Tahoe goes from October 15 – May 1, which limits the window of opportunity for expedited implementation.

Uncertainty associated with the benefits

There is limited uncertainty with this project. As soon as this project is constructed it will reduce the targeted pollutants significantly. The only uncertainty that exists is whether this project will be completed in 2011 or 2012. Phased construction is planned to start in 2011 with the remainder to be completed in 2012.

Description of any adverse impacts

No adverse impacts are anticipated as a result of this project. Potential impacts do exist if a large storm occurs during the construction of the project. This is the case for any project... All BMP's, both temporary and permanent will be in place to mitigate the affects of any storm events that may occur as a result of construction. A SWPPP and SWPPP manager will be in place prior to project construction initiation.

Table1 – Hydrology and Hydraulics Summary

25 Year - 1 Hour (1" Precip)

WS ID	WS	WS Name	Imp Area (AC)	Imp Area ROW (SF)	ROW Only Volume (Cubic FT)	Outfall
2.1		Bernice	4.96388889	128747.03	10729	Pipe #103 (36") on Alice Lake Rd
2.2		Alice Lake	0.61193756	13943.4	1162	Pipe #106 (12") at intersection of Alice Lake Rd and Bernice Ln
2.3		Amador	1.0182966	36041	3003	Pipe #109 (18") on Coppery Wy
	A	TOTAL	6.59412305	178731.43	14894	Pipe #109 (18")
2.4		Copper North	3.25801194	64116.08	5343	Pipe #112 (12")
	D	TOTAL	3.25801194	64116.08	5343	Pipe #112 (12")
2.5		Del Norte East	0.10027548	2556.54	213	Pipe #122 (8")
	H	TOTAL	0.10027548	2556.54	213	Pipe #122 (8")
2.6		Del Norte South	2.98016529	66094.92	5508	Pipe #121 (18")
	C	TOTAL	2.98016529	66094.92	5508	Pipe #121 (18")
2.7		Cold Creek South	1.20805785	30820.13	2568	Pipe #117 (12") at Cold Creek Ct
2.8		Cold Creek North	4.84550046	120321.48	10027	Pipe #116(36"x48") at Cold Creek Tr
2.9		Del Norte	1.48413682	42219.21	3518	Pipe #118 (36"x48") at Del Norte St
	B	TOTAL	7.53769513	193360.82	16113	Pipe #118 (36"x48")
2.1		Copper South	0.44912764	7592.92	633	Pipe #129 (12")
	E	TOTAL	0.44912764	7592.92	633	Pipe #129 (12")
2.11		Del Norte West	0.19793388	4235.63	353	Pipe #128 (12")
	I	TOTAL	0.19793388	4235.63	353	Pipe #128 (12")
2.12		Del Norte North	3.3915978	62913.72	5243	Pipe #127 (??)
	F	TOTAL	3.3915978	62913.72	5243	Pipe #127 (??)
2.13		Fortune West	0.38583563	11460.39	955	Pipe #130 (12")
	G	TOTAL	0.38583563	11460.39	955	Pipe #130 (12")
2.14		Fortune East	0.64072544	17676.46	1473	Pipe #120 (12")
	J	TOTAL	0.64072544	17676.46	1473	Pipe #120 (12")
				ROW volume	50728	

Table 1 – Pollutant Load Reduction Strategy – Project Watershed Summary¹

	WS	Area (acres)	Volume (cubic feet)	TSS Mass (pounds)
ME1	A	111.3	2,703,454	9,599
	B	308	7,165,264	18,087
	C	11.8	440,925	2,330
	D	12.1	453,430	2,372
	E	1.6	60,376	324
	F	16.5	588,025	2,976
	G	1.8	64,161	377
	H	0.5	18,262	115
	I	0.6	26,594	159
	J	2.2	97,951	234
	TOTAL	466.4	11,618,441	36,572
ME2	73	23.10	987230	6,054
	74	46.50	1970170	12,469
	75	8.40	371339	2,348
	76	2.70	94555	631
	77	0.48	26816	227
	78	0.87	38405	273
	79	1.80	64738	520
	80	1.80	61855	362
	81	4.00	145393	955
	82	4.20	163933	1,058
	83	0.64	33830	304
	84	32.30	1209540	10,948
	85	49.70	1314277	17,364
	TOTAL	176.5	6,482,081	53,512
ME3	98	5.70	262230	1,709
	99	8.60	401169	2,183
	100	6.40	270764	1,490
	101	5.10	239159	1,385
	102	1.90	106630	642
	TOTAL	27.70	1,279,951	7,407

Notes:

1. Project watershed area includes County Right of Way, in addition to public and private parcels

Table 3 - PLR ROW Load (Montgomery Estates Area 1)

WSID	TN Mass	DN Mass	TP Mass	DP Mass	TSS Mass
31	35.5	5.2	7.4	1.8	1891.3
33	11.5	1.7	2.4	0.6	617.8
34	11.1	1.6	2.3	0.6	586.8
35	1.6	0.2	0.3	0.1	82.6
36	13.7	2.0	2.8	0.7	729.4
37	2.3	0.3	0.5	0.1	125.5
38	0.7	0.1	0.1	0.0	38.5
39	3.6	0.5	0.8	0.2	191.0
40	1.0	0.1	0.2	0.1	49.9
Total	80.9	11.9	16.8	4.1	4312.7

Table 4 – Volume reduction quantities and reduction effectiveness

	Name	Volume (cf)
Basin 1	Fortune	1242
Basin 2	Del Norte West	270
Basin 3	Del Norte East	405
Basin 4	Cold Creek East	351
Basin 5	Cold Creek West	378
Basin 6	Alice Lake Lower	459
Basin 7	Alice Lake Upper	972
Basin 8	Alice Lake	3672
Basin 9	Copper Basin	1890
Basin 10	Humboldt Basin	1836
		11475

	Name	Volume (cf)
RLC	Bernice	2576
RLC	Copper Basin	784
RLC	Cold Creek tr	532
BLS	Fortune	588
BLS	Cold Creek trail	231
BLS	Bernice	728
		5439

	Quantity	Volume (cf)
36" sediment trap	12	509
48" sediment trap	14	1056
		1564.28

Total Volume Reduction	18478
yr - 1hour Reduction	50728
	36%

EVALUATION AND MONITORING

In March 2006, EDOT completed an Existing Conditions Report for Montgomery Estates Areas 1, 2 and 3⁽¹²⁾. Area 1 was selected as the highest priority based on the necessity to address source control issues and in November 2007, EDOT completed a Formulating Alternatives Memorandum for Area 1. In August 2008, EDOT prepared a Project Alternative Evaluation Report⁽¹³⁾ and a Preferred Alternatives Report⁽¹⁴⁾ for Area 1 that presented the preferred design approach for mitigating the water quality impacts of the Project area.

In the summer of 2008, EDOT completed an outfall/infrastructure inventory as part of the Pollutant Load Reduction Strategy. It was determined that a majority of the conveyance systems within Areas 2 and 3 are functioning as designed. These systems are comprised of curb and gutter, drainage inlets with no sumps, and concrete pipe. Though they are functioning as designed in terms of conveyance, there is minimal treatment of the stormwater prior to discharging from the outfalls. This problem is amplified by the distance between outfall and surface water, ranging from 650 feet to 0 feet (always connected). Figures C2 and C3 shows the alternatives for Areas 2 and 3, respectively.

The monitoring goals for the Project will be:

Hydrologic/Water Quality (H/WQ)

1. To provide hydrologic and loading baseline data to be utilized for evaluating post-construction watershed BMP retrofits.

Photographic (P)

1. To provide pre-construction, construction, and post-construction photographic documentation as required by the State grant guidelines and TRPA/Lahontan regulatory permit requirements (this effort will be funded by other funds).

EDOT has maintained a meteorological station at Sierra House Elementary School since 2000. Additional flow gauges (pressure transducers) will be installed at selected outfalls of the newly constructed BMP's within the Project area. EDOT staff will collect storm water grab samples from post-construction storm events in order to determine the correlation between precipitation, flow, and the concentration of fine sediment. This will allow for an accurate estimation of the annual fine sediment load captured by the Project improvements and measure the volume / flow reduction as a result of the Project as well.

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Attachment 8
Project 9
Placer County Department of Public Works
Griff Creek Water Quality Improvements

Water Quality & Other Expected Benefits

Attachment 8

The Griff Creek Water Quality Improvement Project will restore portions of the SEZ of Griff Creek and provide areas of treatment for storm water runoff. These improvements will reduce fine particle and sediment pollutants that are discharged into Lake Tahoe. Since Lake Tahoe is the drinking water source for Basin communities, the quantifiable water supply benefit of the project would be reduced treatment costs for the public utility district (North Tahoe Public Utility District) to remove nutrients from intake water. Water quality improvement (clarity, reduced nutrients) will result for Lake Tahoe, which is a listed 303(d) impacted water body from sediment.

The improvements proposed to the stream environment zone, revegetation and plantings and the channel improvements will be designed to be self-maintaining. No additional operations or maintenance (other than random, or general maintenance covered under other Placer County funding) should be required once the improvements are constructed. Therefore; annual operations and maintenance (O & M) is zero.

The expected water quality benefits of reduced sediment and nutrient treatment costs were estimated based on average tertiary (secondary) treatment costs/ per gallon of treated drinking water for California public utilities. The water quality benefits from improvement in the channel and stormwater

Estimates Without Project Physical Conditions (Existing Conditions)

An estimated pollutant load analysis was completed for the stormwater originating upgradient in the project area. The volume of runoff from the Project area was estimated from the product of average annual precipitation, watershed area, and directly connected imperviousness. The concentration of total suspended solids (TSS) was estimated based on Event Mean Concentrations (EMC) as a function of land use. Based on existing conditions, the estimated sediment load of TSS from the entire Project area is 49,500 pounds per year. In the Lake Tahoe basin, the important parameter is the fine sediment particles (approximately half of the TSS load) being less than 20 microns.

The total estimated load is from County Right of Way, County parcels, California Tahoe Conservancy (CTC) parcels, USFS parcels, and Private parcels.

Estimates With Project Physical Conditions (Post-Project Conditions)

By restoring additional functioning wetlands, reducing channel undercutting and installing stormwater treatment controls (such as infiltration), the project will reduce the

amount of TSS in the Project Area. The estimated load reduction post-project is 47 % or a total annual discharge reduced to approximately 26,235 pounds annually.

Description of methods used to estimate without and with project conditions

A Pollutant Load Reduction analysis was completed for the stormwater originating from the Project area in pre- and post project conditions. The volume of runoff from the Project area was estimated from the product of average annual precipitation, watershed area, and directly connected imperviousness. The concentration of total suspended solids (TSS) was estimated based on Event Mean Concentrations (EMC) as a function of land use (this research completed by the UC Davis Tahoe Environmental Center in Tahoe City, CA).

The total load reduction is based on the volume reduction as a result of infiltration, storage and treatment. This is estimated based on the size of the water quality structures, detention / infiltration volume and source reductions. For the wetlands restored, it can be assumed that the infiltration will increase as the retention properties increase due to vegetation in the soil.

Because an EMC is used for the calculation of load, the volume reduction and the pollutant load reduction will be the same for the design storm volume and average annual loads. A 47% volume reduction will equate to a 47% load reduction. It is anticipated that the project will exceed 47% removal efficiency due to first flush operating treatment structures and average annual rainfall intensities / quantities being much lower the estimated amounts. Typically urban areas see a mass and concentration first flush, which means that the system will more than likely treat a much higher percentage of pollutants than was estimated using the above mentioned methodologies.

Description of potential other benefits

Other potential benefits include the reduction of nutrients including phosphorous, erosion control, fisheries benefits as a result of less fine sediment clogging spawning gravels, groundwater recharge and public safety. Reduced costs for the NTPUD for tertiary treatment of public drinking water.

Description of the distribution of local, regional, and statewide benefits

Local Regional and Statewide benefits include the protection of an impaired water body and improved public safety from reductions of urban pollutants currently being transported to receiving water bodies. Local benefits include achieving compliance with the TMDL targets through the reduction of fine particulates (sediment) from the project area. Targeting fine particles of this size will also have nutrient load benefits to downstream waters. Other local benefits include the ease of maintenance of structures that capture deicing abrasives in sediment traps and conveyances. These practices control a large pollutant source allowing coarse solids to be easily captured and pulled from the system, rather than be transported downstream clogging conveyances and stream courses.

Identification of beneficiaries

The beneficiaries of this project include the local governments, general public and visitors of the Tahoe Basin. The local government benefits include the funding of capital for treatment of Environmental Improvement Project (EIP) areas. Funding this expense will reduce pollutant loads required as part of the Tahoe TMDL, helping to bring the County closer to threshold objectives and improving stormwater quality. The general public benefits through the implementation of this project by the creation of suitable land that mimics the natural environment by allowing water to naturally infiltrate into the ground, which in turn creates a diverse and sustainable watershed with minimal pollution.

When the benefits will be received

The benefits from this project will be realized as soon as construction is complete. The project could be implemented as soon as summer 2012. The construction season and grading deadline in the Lake Tahoe Basin goes from October 15 – May 1, which limits the window of opportunity for expedited implementation.

Uncertainty associated with the benefits

There is limited uncertainty with this project. As soon as this project is constructed it will reduce the targeted pollutants significantly, with immediate impact.

Description of any adverse impacts

No adverse impacts are anticipated as a result of this project. Potential impacts do exist if a large storm occurs during the construction of the project. This is the case for any project. Because construction protections will be in place, this risk is minimal.

EVALUATION AND MONITORING

In May 2006, Placer County completed a design analysis of the Griff Creek sub-watershed, part of the larger overall Kings Beach Watershed. A combined CEQA/NEPA environmental document was completed in December 2008. The monitoring goals for the Project will be:

Hydrologic/Water Quality (H/WQ)

1. To provide hydrologic and loading baseline data to be utilized for evaluating post-construction watershed BMP retrofits.

Photographic (P)

1. To provide pre-construction, construction, and post-construction photographic documentation as required by the State grant guidelines and TRPA/Lahontan regulatory permit requirements (this effort will be funded by other funds).

Placer County staff will collect storm water grab samples from post-construction storm events in order to determine the correlation between precipitation, flow, and the concentration of fine sediment. This will allow for an accurate estimation of the annual fine sediment load captured by the Project improvements and measure the volume / flow reduction as a result of the Project as well.